CASE REPORT

Second mRNA Vaccination of COVID-19 in a Patient Who Developed Pericarditis after the First Vaccination
A Case Report

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Summary

The coronavirus infection 2019 (COVID-19) pandemic has led to the development of mRNA vaccines with proven efficacy. However, it remains unclear whether patients who developed pericarditis after the first COVID-19 mRNA would be fit to receive the second vaccination. Herein, we present the case of a 64-year-old man who visited our emergency department with substernal chest discomfort that began 4 days after his first mRNA COVID-19 vaccination. Acute pericarditis was diagnosed based on symptoms and ST-segment elevation on an electrocardiogram. Chest pain improved 2 days after treatment.

Since there are no guidelines on whether to administer an additional vaccination to a patient who developed pericarditis after the initial vaccination, we considered whether or not to administer the additional vaccination. We informed the patient about the risks and benefits and decided to administer the second dose. He did not experience any major adverse reactions. The indications for the second vaccination need to be thoroughly considered.

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Key words: Side effects

The Coronavirus infection 2019 (COVID-19) pandemic is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and resulted in a global health and economic crisis. The efficacy of the mRNA-1273 SARS-CoV-2 vaccine (Moderna) in preventing COVID-19 infection was 93%. It has been reported that muscle pain, fatigue, and headache are common side effects, while cardiovascular side effects are relatively rare.[1,2] It is unclear whether patients who developed pericarditis after the first COVID-19 mRNA would be fit to receive additional vaccinations. We present a case of acute pericarditis that developed immediately after the first mRNA vaccination for COVID-19. The patient was able to successfully receive a second dose.

Case Report

A 64-year-old man with a history of hypertension presented to our emergency department complaining of chest pain that had started 4 days after the first dose of mRNA-1273 SARS-CoV-2 vaccine (Moderna). He had a blood pressure of 169/99 mmHg, heart rate of 100 beats per minute, respiratory rate of 18 breaths per minute, body temperature of 36.8°C, and oxygen saturation of 96% at room air. On physical examination, pericardial friction sounds were heard. An electrocardiogram (ECG) showed ST-segment elevation in several leads except for lead aVR and PR elevation in lead aVR and PR decreases in leads II, III, and aVF (Figure 1A). The serum C-reactive protein (CRP) level was elevated to 11.38 mg/dL, but the highly sensitive troponin-I was within the normal range (< 10 pg/mL). Transthoracic echocardiography showed normal left ventricular function with an ejection fraction of 60% and slight pericardial effusion (Figure 2). Chest computed tomography (CT) showed non-calcified pericardial thickening with little pericardial effusion (Figure 3). Based on the aforementioned findings, the patient was diagnosed with acute pericarditis. We recommended hospitalization; however, he requested outpatient treatment. Therefore, he was treated with aspirin 300 mg 3 times per day. Two days after treatment initiation, the patient's symptoms improved. The serum CRP decreased to 0.52 mg/dL and the ST-segment elevation on the ECG also improved (Figure 1B). Cardiac magnetic resonance imaging 16 days after the last visit showed no findings of myocardial edema on T2-weighted images or late gadolinium enhancement (Figure 4). He was strongly requested to receive the second dose of Moderna vaccine. We informed the patient about the risks and benefits and decided to administer the second dose. He visited the hospital 4 days after the second vaccination, and returned for a follow-up visit without any symptoms of pericarditis or

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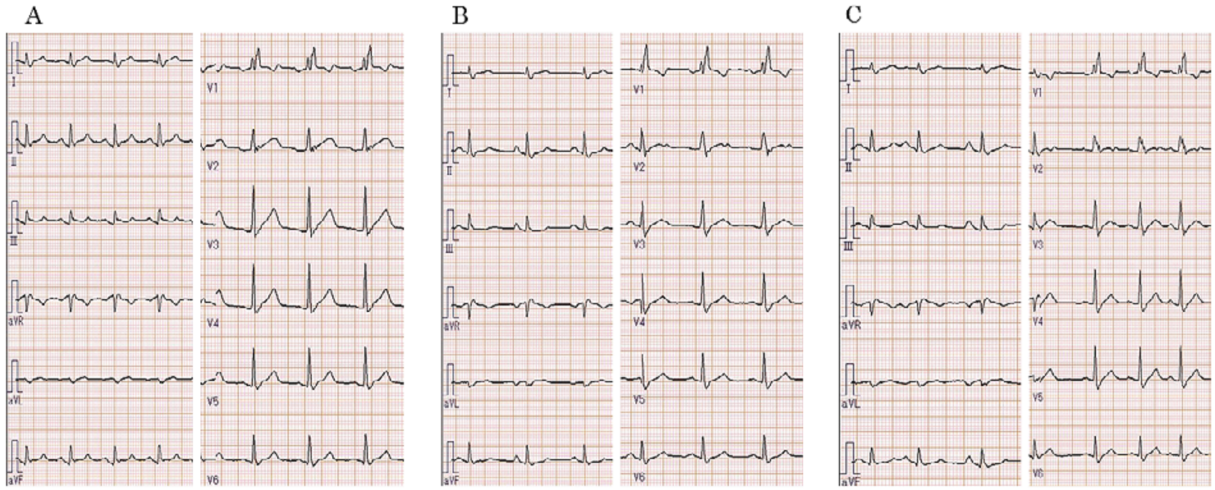


Figure 1. ECG findings. **A:** Initial ECG taken in the emergency room. Diffuse ST-segment elevations were observed over a wide range. Furthermore, PR elevation in the aVR lead and PR decreases in the II/III/aVF leads were noted. **B:** ECG taken 6 days after the visit, showing improvement of the ST-segment elevation. **C:** ECG after the second vaccination. No significant changes were noted.

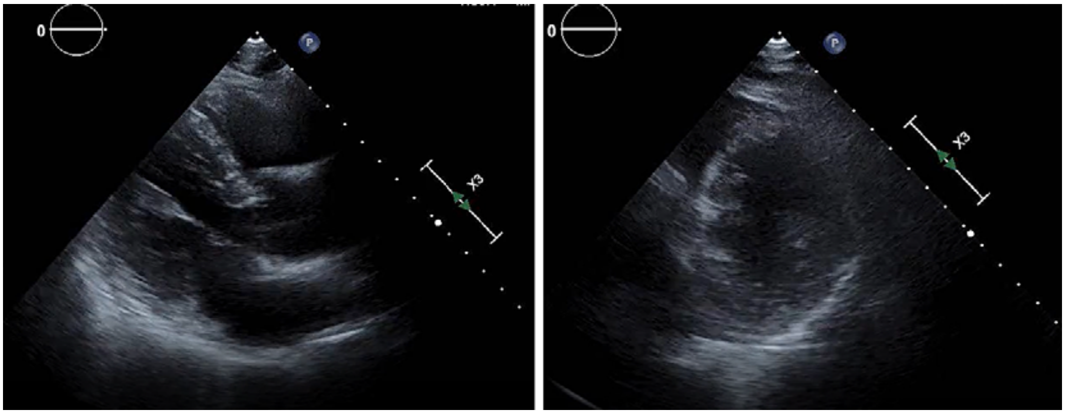


Figure 2. Transthoracic echocardiography showed normal left ventricular function with an ejection fraction of 60% and only slight pericardial effusion.



Figure 3. Chest CT image at the time of initial emergency department visit. Non-calcified pericardial thickening with pericardial effusion was noted.

side effects from the vaccine. The second ECG was unremarkable (Figure 1C) and blood tests showed no significant elevation in inflammatory markers (WBC 5100/μL; CRP 0.10 mg/dL).

Discussion

This case involved an elderly male patient who developed pericarditis after the first dose of Moderna vaccine, but it did not recur and he did not experience any symptoms after the second vaccination. In Japan, 2 mRNA vaccines against COVID-19 (Pfizer-BioNTech, Moderna) and one viral vector vaccine (AstraZeneca) are currently being used. The efficacy of the mRNA COVID-19 vaccine is reported to be almost 90%, while that of the viral vector vaccine is almost 70%. The most common adverse events include headache, fatigue, myalgia, chills, and pain at the injection site. Serious adverse reactions are extremely rare.[2,3] In clinical trials, serious cardiovascular side effects were reported in less than 0.1% of patients who received the Moderna vaccine, including congestive heart failure, bradycardia, atrial fibrillation, hypertension, acute myocardial infarction, and acute coronary syn-

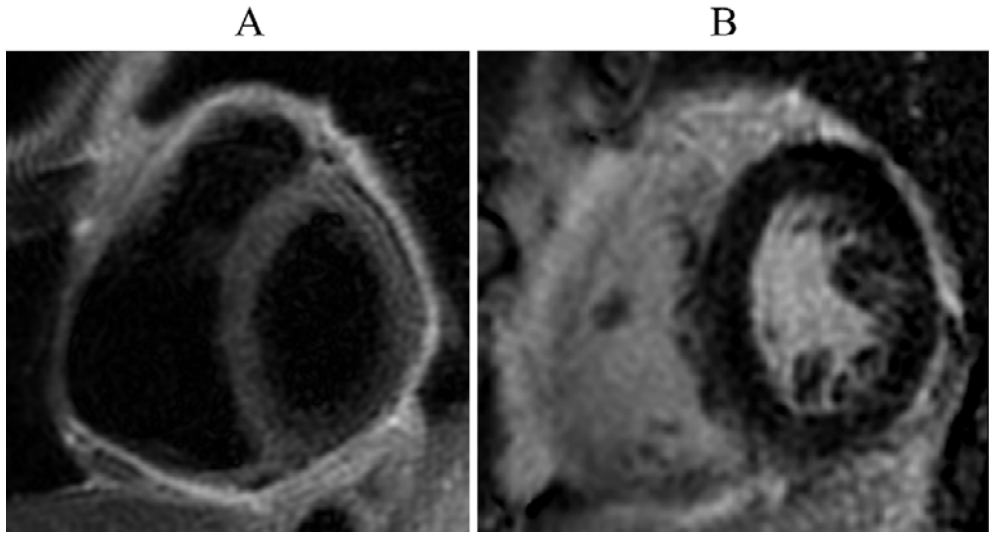


Figure 4. Cardiac magnetic resonance (CMR) imaging 16 days after the initial visit. T2-weighted imaging (**A**) and late gadolinium enhancement (LGE) (**B**). There were no significant findings on the LGE or T2-weighted images.

drome.[2] Recently, Takotsubo syndrome after receiving the Moderna vaccine has been reported.[4] In a review of the United States Vaccine Adverse Event Reporting System (VAERS) between December 29, 2020 and June 11, 2021, there were 1,226 cases of myocarditis or pericarditis after mRNA vaccination.[5] Gender and age are important factors associated with the adverse effects of myocarditis or pericarditis in patients receiving mRNA vaccines. According to a summary by Japan's Ministry of Health and Labor and Welfare, the number of cases of myocarditis and pericarditis after administration of the Moderna vaccine was clearly higher than that after the Pfizer vaccination in male patients in their teens and 20s, but there was no difference in the elderly.

Thus, should patients who develop pericarditis after the first vaccination receive the second vaccination? The current guidelines do not specify what to do concerning the second dose of vaccination if a serious adverse reaction occurs after the first vaccination, with the exception of a history of severe hypersensitivity reaction to vaccine components. The risk for the recurrence of pericarditis from additional vaccination and the benefit of COVID-19 suppression need to be considered. An analysis from Israel, which was one of the first countries in the world to promote COVID-19 vaccination, found the vaccine was effective in reducing infection by 85% after the first dose.[6] However, this was a report at the beginning of the COVID-19 vaccination process, and it has also been reported that mutant strains, such as the delta strain, do not respond well to a one-time vaccination.[7] A few studies have investigated the risk of pericarditis recurrence after the first vaccination. In an observational study, pericarditis occurred in 15 cases (0.7 per 100,000) after the first dose and in 22 cases (1.1 per 100,000) after the second dose. Seven patients who were diagnosed with pericarditis after the first vaccination received a second vaccination and no one died.[8] Based on this report, the recurrence of life-threatening adverse effects is rare. Therefore, a second vaccination should be considered in high-risk cases of COVID-19.

Disclosure

Conflicts of interest: None.

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